REMARKS

Claims 1-11 are pending in this application. Claims 4 and 8 have been amended to more distinctively claim Applicants' invention.

Claims is Rejected Under 35 U.S.C. §112

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner stated that "[i]n claim 1, it is unclear where the equation, $\alpha=-(dn_{eff}/dT)n_{eff}$, originated from. There is no support in the specification as to where the equation originated."

Applicants have amended paragraph 39 to state that " [0039] The principle of the compensation of temperature influences on the Bragg wavelength in Fibre Bragg gratings according to the invention is based on a "passive" method. A coating of a material, preferably a polymeric material, is concentrically surrounding the optical fibre having the grating area. This material is characterized by a negative thermal expansion coefficient α (TEC) equal to $\alpha_{FBG\ packaged}$ (-7 to $-9\cdot 10^{-6}$/K). Depending on the nature of the fibre, the values of the thermooptic coefficient and effective refractive index are variable. In most cases, a value in the range comprising $10\text{-}11.10^{-6}$/K and 1.45-1.47 will be sufficient. Accordingly, a fibre grating filter optical waveguide device comprises an optical fibre consisting essentially of silica, whereby said optical fibre has an area with a diffractive grating region and wherein said area with a diffractive grating region is covered with a material having a negative thermal expansion coefficient α satisfying the following equation: $\alpha=-(dn_{eff}/dT)n_{eff}$ wherein dn_{eff}/dT is the thermo-optic coefficient of the fibre material and n_{eff} is the effective refractive index." The support for this edit can be found, for example, in paragraph 20. The equation "$\alpha=-(dn_{eff}/dT)n_{eff}$" in

Claim 1 originates from the description in the summary of the invention in paragraph 20, reciting in pertinent part, "said optical fibre has an area with a diffractive grating region and wherein said area with a diffractive grating region is covered with a material having a negative thermal expansion coefficient" where each part of the equation is further elaborated in paragraph 20 in stating that the term "dn_{eff}/dT" is the thermo-optic coefficient of the fibre material and the term "n_{eff}" is the effective refractive index.

Claims 1-2 are Rejected Under 35 U.S.C. §103(a)

Claims 1 and 2 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,067,392 to Wakami et al. The Examiner stated that

> Wakami et al. discloses a diffraction fiber grating region on an optical fiber. Further, Wakami et al. discloses a diffracting grating region to be in contact with a polymer material with a negative thermal expansion coefficient. (Abstract and Column 2) but Wakami et al. fails to disclose the fiber to consist of essentially silica. However, Wakami et al. does discloses the optical fiber to consist of glass. Additionally, since the glass material in optical fibers is commonly silica, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have an optical fiber made essentially of silica.

> Claim 1 recites

> Fibre grating filter optical waveguide device, comprising an optical fibre consisting essentially of silica, whereby said optical fibre has an area with a diffracting grating region, wherein said area with a diffracting grating region is in direct contact with a material having a negative thermal expansion coefficient α satisfying the following equation:
> $$\alpha=-(dn_{eff}/dT)n_{eff}$$
> wherein dn_{eff}/dT is the thermo-optic coefficient of the fibre material and n_{eff} is the effective refractive index. (Emphasis Added).

In contrast, the Wakami et al. reference does not disclose how the computation of the negative thermal expansion coefficient is calculated. (See Abstract). Nowhere does the Wakami et al. reference describes an equation for calculating the negative thermal expansion coefficient. Because the Wakami et al. reference fails to disclose having a negative thermal

expansion coefficient α that satisfies the equation, it is respectfully submitted that Claims 1 and 2 are patentable over the cited reference of Wakami et al.

Claims 3-5 are Rejected Under 35 U.S.C. §103(a)

Claims 3-5 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,067,392 to Wakami et al. as applied to claims 1 and 2 above, and in further view of U.S. Patent 5,851,427 to Kelly. The Examiner stated that

> Wakami et al. discloses all discussed above, but fails to specifically disclose that the polymeric material is a crosslinked polymeric material or a monomeric and/or oligomeric precursor material with an anisotropic behavior and that the polymeric material exhibits a negative linear coefficient along with the fiber axis. However, Kelly discloses a crosslinked polymeric material for use in liquid crystal materials for waveguides and filters, such a grating filters. Furthermore, Kelly also discloses it is known in the art to use oligomerizable liquid crystals with the optical characteristic of anisotrophy in waveguides and filters. And since Wakami et al. discloses a liquid crystal polymer in general and does not specify the type of liquid crystal polymer, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have used a crosslinked polymeric material or a monomeric and/or oligomeric precursor material with an anisotropic behavior for the purpose of coating an optical fiber. Furthermore, from the graph in figure 4, it can be seen that the ambient temperature and the wavelengths are consistent in the present invention. Therefore, since the temperature is a constant and linear, it would have been obvious at the time the invention was made to a person having ordinary skill in the art for the negative coefficient is linear as well. (Emphasis Added).

First, Claims 3-7 depend, directly or indirectly, from the base Claim 1 and are patentable over the cited references of Chen et al. in view of Houlihan et al. and Riant et al. and in further view of Dawes et al. for at least the same reasons described for Claim 1.

Second, the Federal Circuit held that "we have been guided by the well-suited principles that the claimed invention must be considered as a whole, multiple cited prior art references must suggest the desirability of being combined, and the references must be viewed without the benefit of hindsight afforded by the disclosure. *In re Paulsen*, 30 F.3d 1475, 1482, 31 USPQ2d 1671, 1676 (Fed. Cir. 1994) *citing Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5,

229 USPQ 182, 187 n.5 (Fed. Cir.), *cert. denied,* 479 U.S. 827, 107 5. Ct. 106, 93 L. Ed. 2d 55 (1986). (Emphasis Added). At the time the invention was made by Wakami et al., there is no discussion, motivation or suggestion at all by the Wakami et al. reference on the use of crosslinked polymeric material or a monomeric and/or oligomeric precursor material with an anisotropic behavior. In addition, at the time that the invention was made by Kelly, there is no discussion, motivation or suggestion at all by the Kelly reference about the negative thermal expansion coefficient. Applicants respectfully submit that the benefit of hindsight to combine these two references is an improper basis for rendering an obvious rejection.

<u>Claims 8 –11are Rejected Under 35 U.S.C. §103(a)</u>

Claims 8-11 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,067,392 to Wakami et al. as applied to claim 1 above, and in further view of U.S. Patent 5,302,538 to Matsumoto. The Examiner stated that

> Wakami et al. discloses forming a diffraction grating area along the optical axis of an optical fiber, bring in contact a material that will be in contact with the grating area and coat the fiber and then curing the layer of material by UV radiation. But Wakami et al. fails to specifically disclose that the material is a monomeric and/or oligomeric material cured by temperature, electron beam or gamma radiation. However, Matsumoto discloses that a polymer for coating an optical fiber in communication systems where the polymer material can be a monomer or oligomer material. Further, Matsumoto discloses that the curing of the material can be accomplished by temperature, electron beam or gamma radiation as well as UV radiation. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have a material that is a monomeric and/or oligomeric material cured by either temperature, electron beam, UV or gamma radiation.

Independent method Claim 8 includes similar limitations as Claim 1 and recites "[m]ethod for manufacturing a device according to one of the preceding claims, comprising the following steps: forming a diffraction grating area along an optical axis of an optical fibre bringing in contact of at least said area of the optical fibre with monomeric and/or oligomeric precursor materials give a layer or a coating of said monomeric and/or oligomeric precursor

materials on at least said area curing the layer of the monomeric and/or oligomeric precursor materials, wherein said diffraction grating area is in direct contact with said monomeric and/or oligomeric precursor materials having a negative thermal expansion coefficient α satisfying the following equation: $\alpha=-(dn_{eff}/dT)n_{eff}$ wherein dn_{eff}/dT is the thermo-optic coefficient of the fibre material and n_{eff} is the effective refractive index."

Claims 9-11 depend from the base Claim 8 and are patentable over the cited references of to Wakami et al. and in further view of Matsumoto.

Conclusion

Claims 1-11 are pending in this application. In view of the amendments to the claims and the above remarks, Applicants respectfully request allowance of the these pending Claims. If the Examiner's action is other than allowance, the Examiner is invited to telephone Applicants' attorney at the number noted below.

Respectfully submitted,

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Date

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